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ABSTRACT

This multidisciplinary guide, developed for teachers in the secondary schools, stresses the use of Man and Environment in Arkansas. The guide illustrates how teachers in social studies, the arts, English, science, physical education and health, home economics, and mathematics can implement these materials into their present classroom situations. A brief summary of each topic is included. Among the programs summarized are Environmental Imperatives, Air Pollution, Water, Scenic Pollution--Solid Waste, Conservation of Vital Resources, Energy, Population Dynamics, Urbanization, Value Systems, Concepts of Change, and Individual Involvement. The basic concepts contained in the modules are identified. This material was developed to offer teachers the opportunity to obtain insight into the teaching objectives of the modules and panel discussions. A listing of free films is appended. (BT)

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MAN AND ENVIRONMENT

a multidisciplinary teachers guide

by

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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We want and we can have both the employment and economic base of industrialization while retaining a quality environment. It means we must occasionally vote against our own selfish interests. But it can be done.

--The Honorable Dale Bumpers
Governor
State of Arkansas

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Human history more and more becomes a race between education and catastrophe.

--H. G. Wells

This guide is prepared as a part of the services provided by the Department of Education under a grant from Public Law 91-516 "The Environmental Education Act".

The most important goal of ecology in the curriculum is for the child to stop looking at the world as a conglomeration of independent 'things'.

--Stewart L. Udall

Y O U R C L A S S E S S H O U L D V I E W T H I S S E R I E S ! ! !

WHY?

I. In general:

The issues dealt with in this series affect all of us. Exploding world population, Man's depletion of his environment and concomitant depletion of crucial natural resources are situations that threaten Man's very survival on the Earth. These problems by their nature must be approached in a multidisciplinary manner to afford a thorough understanding of them and seek their solutions. This presents teachers with a rare educational opportunity. The *Man and Environment* series is a thoughtful, stimulating, extremely well-produced exposition of the environmental crisis, presented in a manner which appeals to students. The series is modular in format so that each unit is complete in itself. You may use any or all parts of the series without loss of coherence. This type of learning system enables your class to adapt the system to its own purposes.

II. Specifically:

SOCIAL STUDIES

Many social problems are encountered in this material with widespread ramifications, for example, the creation of constraints on the nature and direction of urban and regional development and patterns of land use. The social studies classes could examine these problems from historical, economic, political, legal, behavioral and cultural viewpoints, among others.

ENGLISH

Basic to the solution of the environmental crisis is the development of a new sensibility in Man. Many writers have dealt with the need for such an "awareness". Literature classes can make good use of such material and creative writing activities can crystallize the ideas of the students themselves.

THE ARTS

The creative activities of the arts offer the capacity of ultimately affecting the quality of thinking itself -- as an eloquent counter-challenge to the one-dimensional certitudes of technological ego. Teachers of the arts will find it easy to involve students in activities related to Man's environment. This series is replete with current and past works of music and art related to the environmental crisis. This affords an opportunity for teachers to use a "humanities" approach to integrating environmental materials into the arts.

SCIENCE

Scientists are now realizing that many of the noble intentions of their labors have been transformed through technology to meet the selfish desires of Man. Our survival seems to depend in part on our ability to examine this sphere of human activity objectively and relate it to its human content. Science teachers have a fascinating challenge here -- to involve students not only in a search for understanding of the biological and physical systems and cycles which function in the ecosphere, but also to find ways to use this understanding for the benefit of Man and his environment.

PHYSICAL EDUCATION AND HEALTH

The series emphasizes that human health is threatened by an immense variety of airborne and waterborne pollutants, ranging from heavy metals and synthetic organic pesticides to radiation, disease-causing organisms, and noise. There has also been a drastic deterioration in what might be called the "aesthetic" environment, especially in our cities. Any student involved in activities of physical fitness, health, recreation and other related experiences will be interested in these programs.

HOME ECONOMICS

The world "ecology" as seen from its Greek origin, means the study of the household of Man, i.e., his environment. Good ecological practices do in fact begin at home. Home economics classes can relate their studies to environmental considerations. For example, choices in the marketplace as related to the household have a tremendous impact on the quality of the environment.

MATH

The math teacher who is concerned with environmental considerations can be very creative in relating problem-solving activities to this area. Such subjects as sets, graphing, statistics, logarithyms, and even basic arithmetical operations can be related to areas such as measurement of noise levels, population growth studies, waste disposal calculations, land use planning, etc.

THE FOLLOWING GUIDES ARE FOR YOUR USE ! ! !

HOW CAN YOU USE THEM ? ? ?

I. HOLD A BUILDING MEETING: A meeting of the key teachers to be involved in this program should be held to discuss the implementation at the building level.

   A. Decide which classes should view each module according to relevance, curriculum and audio-visual materials available. VIEWING SHOULD INVOLVE ALL DISCIPLINES!!!

   B. Schedule follow-up meetings throughout the program year to coordinate the use of the suggested activities among subject areas.

II. THE SUMMARIES: A brief summary of each program is given, stressing the basic concepts contained in the modules. By reading this material teachers can obtain a beforehand insight into the teaching objectives of the modules and panel discussions.

III. THE ACTIVITY SUGGESTIONS: A section in each module guide is devoted to suggestions for teaching activities. Since the first module, "Environmental Imperatives", provides an overview for the entire series, the suggestions in this section are more general in nature and can be implemented throughout the program year. The other suggestions are specifically related to their respective module.

IV. A BASIC LIBRARY FOR STUDENTS AND TEACHERS:

A. People & Their Environment (curriculum guides)

Vol. 3, Science, Grade 7, 8, 9	$3.40
Vol. 4, Social Studies, Grade 7, 8, 9	$3.40
Vol. 5, Social Studies, Grade 10, 11, 12	$3.40
Vol. 6, Home Economics, Grade 9, 10, 11, 12	$3.40
Vol. 7, Biology	$3.40

J. G. Ferguson Publishing Company, 6 North Michigan Avenue, Chicago, Illinois 60602

B. Population Bomb, Paul R. Ehrlich $ .95
Moment in the Sun, Robert & Leona Train $ .95
The Environmental Handbook, Garrett DeBell $ .95
Ballantine Books, 36 West 20th Street, New York, New York 10003

C. Science and Survival, Barry Commoner $1.65
Viking Press, 625 Madison Avenue, New York, New York 10022

D. Career Education in the Environment
Olympus Research Corporation, 955 E. 9th South, Salt Lake City, Utah 84102

E. Population and the American Future, Final report of the President's Commission on Population. Excellent for social studies classes. Available free from your congressman or available from Zero Population Growth, Inc., 4080 Fabian Way, Palo Alto, California 94303 - $1.50.

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We travel together, passengers on a little spaceship, dependent on its vulnerable reserves of air and soil; all committed for our safety to its security and peace; preserved from annihilation only by the care, the work and the love we give our fragile craft.

--Adlai Stevenson
(Farewell Address to The United Nations)

ENVIRONMENTAL IMPERATIVES

A part of the series, *Man and Environment*,
produced for television by Miami-Dade Junior
College, Miami, Florida
Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

Environmental Imperatives acts as an introduction and an overview for the entire series. Five such imperatives are stressed: 1) Man is vulnerable; 2) Man is an integral part of the environment; 3) The resources of the planet are finite; 4) The values and lifestyles that Man has developed are at the core of his problems; 5) Future planning must include ecological considerations.

The program opens by tracing the evolution of the Earth from a cloud of gas to a sea-covered planet able to sustain the first forms of life. The interrelationship of creatures and environment is shown in perspective, as animals are seen to survive or perish, according to their ability to adapt to the environment. Man, having adapted to such slow and natural changes, is currently creating unnatural alterations which may be beyond his limits of adaptation. For example, he is rapidly depleting Earth's natural resources such as oil and coal which were formed over eons of time. His devices of industry and transportation compete with him for the life-sustaining substances - water and oxygen.

The program concludes by stressing the need for a planned and orderly change in the lifestyle of Man, and by viewing today's youth as the best hope of the future in taking the initiative to bring this about.

By seeing this program we can better understand what is happening to the environment today - and why. The students must see that the basic imperative is a reordering of our priorities and a realization that in the long run the destruction of our environment will destroy our high standard of living. It must be understood that the biosphere is a closed system. As Francis Thompson wrote:

All things to each other
by almighty power
hidden linked are
That thou cans't not touch
a flower
Without troubling of a star.

SUGGESTIONS FOR CLASS ACTIVITIES

Throughout this series keep in mind that environmental problems on a national level have an impact on our own state and ultimately on your local community. Sometimes we feel isolated from and immune to these problems, but Arkansas is currently "being discovered" (as California was) by people seeking to escape a crowded, polluted environment. Most Arkansans are not aware of the state's ever-increasing problems of: 1) Solid waste disposal; 2) Water pollution from municipal waste; 3) Agricultural run-off and pesticides; 4) Rapid influx of people seeking a cleaner environment; 5) Increasing pollution of the air, which has reached serious proportions in some areas; 6) Critical need for land use planning; 7) The continued increase in the visual pollution of the state's scenic areas; and 8) All the other environmental problems associated with these developments, such as noise, urban sprawl, etc.

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- Discuss the alternative cost concept in the environmental sense: resources are finite - but to save coal means having less power generated. Choice between present and future, using or saving, paying to clean up environment means less to commit to other things.

- To what extent does planning and environmental control conflict with individual freedom? Are they in direct conflict? (Private right vs. public good).

- How could accepting environmental imperatives without understanding costs be as disastrous as not accepting them at all? (What would happen if we outlawed all pesticides and herbicides immediately; the internal combustion engine; set up too vigorous water or air pollution requirements for users to meet?)

- Divide your classes into small groups and have them choose a topic related to an environmental problem, research it and present a report to the class. See that attention is given to every level of the problem, from local to international.

- Compile a reading list of materials available in the classroom and the school library which are appropriate to this series. Use the list as a basis for reading assignments. For example, one of the programmed learning aids entitled *Introduction to Environmental Science* by Phillips W. Forster, can be ordered from Learning Systems Company, 1818 Ridge Road, Homewood, Illinois 60430, $3.50 a copy. Do not let the word "science" fool you. This is an excellent multidisciplinary book loaded with economics, history, science and social issues.

- Make use of outside resources such as films (see list of free films in this guide) and guest speakers. Design or obtain simulation games such as "Population 2000". (Available from Arkansas Department of Education).

- Involve your students in the production of an assembly program to make your student body more aware of the environmental crisis.

- Design and produce an imaginative poster and leaflet campaign to stimulate community interest in these issues. Conduct a letter-writing session to allow students to express their feelings on these matters to their elected officials, local, state and national. Make every effort to avoid sending letters to officials about problems over which they have no control or jurisdiction. Send no more than one class letter to the appropriate official. Elected officials can be overburdened with letters of a repetitive nature but welcome a limited number of well prepared, succinct communications on important issues.

- Conduct a fact-finding study, opinion poll, or other such study dealing with environmental problems in your community.

- Take field trips to see environmental problem areas in your community. Locate the major air, water and land users on base maps of your community. Don't worry about completing this project in a day or so, but add to it as new data is collected. Do not limit field trips to the major polluters but also contact businesses and industries that pollute little. What does this imply for economic growth and development for your community and the state? Find out what action needs to be taken to solve these problems. Simulated or actual community meetings dealing with these solutions could be conducted.

- Encourage students to monitor the news media - newspapers, periodicals, radio and television - for pertinent items. Encourage your local media to participate in an environmental awareness campaign. Make your resources available to them.

- Sponsor an ecology "fair" (call it "Earth Art in the Park", for example) complete with environmental art work, live music, a picnic lunch, eco-speeches, etc.

- Contact local organizations (church, civic, etc.) and offer your assistance in a joint project to improve the environment in your community.

- Conduct an environmental beautification project, cleaning up and beautifying blighted areas. (Painting, planting flowers, trees, etc.) The Forestry Service, Soil Conservation Service and Agricultural Extension Service can be helpful in providing information about what to plant and how to design or landscape an area to achieve your goals.

- Encourage students to participate in contests such as the Arkansas Department of Education Eco-Foto Photography Contest and the Advisory Council for Environmental Education Essay Writing Contest.

- Institute your own environmental awareness contest. (For ideas send self-addressed stamped envelope to:

Environmental Health Task Force
Western Arkansas Planning and Development, Inc.
510 North Greenwood Avenue
Fort Smith, Arkansas 72901

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The chess-board is the world; the pieces are the phenomena of the universe; the rules of the game are what we call the laws of Nature. The player on the other side is hidden from us. We know that his play is always fair, just, and patient. But also we know, to our cost, that he never overlooks a mistake, or makes the smallest allowance for ignorance...

--Thomas Huxley
(1825-1895)

The air nimbly and sweetly recommends itself unto our gentle senses.

--William Shakespeare
"Macbeth"

Welcome, sulphur dioxide,
Hello, carbon monoxide,
The air, the air is everywhere...

--Nat Shapiro
"Hair"

AIR POLLUTION

A part of the series, *Man and Environment*, produced for television by Miami-Dade Junior College, Miami, Florida

Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

This program deals with the contamination of the Earth's atmosphere. Air is seen as Man's immediate life-substance without which he would die in a matter of minutes. The fact is that, unlike water, he must breathe it in whatever condition it exists, pure or suffocatingly filthy. It is pointed out that the biosphere is a closed system, entrapping all the contaminants produced on Earth. These contaminants experience a variety of chemical transformations, creating substances that are potentially disastrous to all forms of life. Industry and particularly the automobile are shown to be the heaviest polluters of the air.

The module concludes with the highly entertaining animated story of Fenwick Hack, the "average man", whose search for the major sources of air pollution causes him to confront several suspects in his community. Each claims vast, expensive efforts at clearing the air, and each "passes the buck" on to the next party. At the conclusion of the trip, Mr. Hack proves that he too is part of this syndrome, in placing his own personal interest before the need to participate in the fight against air pollution.

Students who view this program should realize that air pollution disasters of major proportion have occurred and action must be taken now or more, even worse such catastrophes can be expected in the future. They can also expect irreparable damage to works of art and architecture, monuments and other structures, and to themselves, in the form of lung diseases. They must realize that the solution to the problem will be costly, both in terms of time and expense. One of the basic laws of ecology is: "There is no such thing as a free lunch."

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SUGGESTIONS FOR CLASS ACTIVITIES

- Discuss air as a "free good" as described by economists until recently. Who owns the air? Who is responsible for the air? In what ways is air pollution costing every individual in terms of health, taxes, upkeep and maintenance of home, car, etc.?

- Emphasize the opportunity cost of having clean air at the expense of other goods and services.

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- Why should labor be interested in air pollution? Do working conditions extend beyond the plant or factory? What about "living conditions"? If cost of production is increased, who will pay the bill - labor, consumer, owner, government, all?

- Explain why, and give examples, the advantages of scale economics concept contributes to air pollution. Then discuss the alternative costs of reversing the concept.

- Air pollution is a world-wide problem. The solution must be world wide. Does this mean that the United Nations should be given economic and social "teeth" to enforce some solutions? How likely is this to happen?

- One extreme example of a way to solve air pollution is to erect gigantic filters to cleanse the air as it passes, much like we have air-conditioning filters. What economic questions must be answered to do this?

- Design a survey of local air pollution sources and the types of emissions. Test your list against the same kind of information compiled by the Arkansas Department of Pollution Control and Ecology for accuracy and comprehensiveness.

- Field trips or individual trips to other environments can give firsthand understanding of the problems. Do not limit trips to polluting industries alone. City children should become more aware of the rural environment and nature. The National Park Service and National Forest Service and the Arkansas Department of Parks and Tourism have programs and sites available across the state.

- Compile an attitude survey from the information gathered above to be administered to a cross section of your community. Use the surveys to develop a simulation of a community where the attitudes and problems are presented and possible solutions discussed. This activity could be developed into a play and presented to PTA or other community groups.

- Compile a list of persons responsible for air standards at the local then state and national levels. Examine air quality laws at each of these levels.

- Research the history of air pollution in your city or county. Where did the problems begin? What social and economic forces were, and are still at work that relate to the specific problems of your community?

- Write and produce radio programs based on the information you have compiled with your studies. Many program directors for local stations will cooperate in scheduling this kind of local program. Some programs of this nature may be as short as 5 minutes or as long as 30 minutes.

- Organize a "speakers bureau" through the speech or English classes to present topical programs at civic and business clubs.

- Play the recordings of, or have students perform the music to "On A Clear Day You Can See Forever", "Air" (from the musical "Hair"), "What Have They Done to the Rain?" by Melvina Reynolds, "Mercy, Mercy Me", by Marvin Gaye, "The Critters" by Roy Clark, and other music suitable to this problem. Challenge enterprising

young composers to produce their own music.

- Letters and articles to the local newspaper(s) could be written in journalism or English class. There is a need to explain some of the terminology of air pollution to the public.

- A science or health class might investigate the effects of local air pollution on community health. Particulate levels in the air could be studied by placing glass slides coated with petroleum jelly in key locations around your school and town for one or two days and observing the results. These classes can also relate this material to a study of the human respiratory system. Math classes could participate in calculations of air pollutant levels, costs of air pollution, etc. An excellent resource on health and air pollution is the Arkansas Tuberculosis and Respiratory Disease Association, 412 West 7th, Little Rock, Arkansas 72201.

- Home economics classes might review convenience packaging materials and the effect on the atmosphere when these materials are burned.

- Have students investigate the Supersonic Transport controversy, contrasting the proposed economic benefits to the possible environmental hazards, including those related to air pollution.

- Science classes can tie physics and chemistry studies to the reactions of photochemical smog production, the biosphere as a closed conservation system, properties of gases, etc.

- Conduct a study into alternatives to the internal combustion engine, such as those using steam, solar, atomic and electrical energy.

- For information on a proposed Arkansas electric car, write Mr. Bill Rogers, Chairman, Arkansas Electrical Industry Task Force, 1515 West 7th Street, Suite 315, Little Rock, Arkansas 72202.

- Art classes might center a "creation" activity around air pollution, attempting, for example, to capture the problem on canvas or sketch pad.

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For where I dwell
Where I put
My foot
My mind
My soul
After each day's
Victory
Or defeat-
Where I dwell?
Becomes
The epitome
Of a little bit
Of Heaven
Or a large part
Of Hell.

--Anon

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And then you have the shining river, winding here and there and yonder, its sweep interrupted at intervals by clusters of wooded islands threaded by silver channels; and you have glimpses of distant villages, asleep upon capes; and of stealthy rafts slipping along in the shade of the forest walls; and of white steamers vanishing around remote points.

--Mark Twain
"Life on the Mississippi"

WATER: SUPPLY, DEMAND AND POLLUTION

A part of the series, *Man and Environment*, produced for television by Miami-Dade Junior College, Miami, Florida
Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

The program begins by stressing the importance of clean water to our survival. We see that water exists on Earth in a fixed amount and is continuously cycled through the Earth's ecosystem. Water pollution is defined as anything that impairs the quality of water for use in designed purposes. From microscopic details of the biological processes involved in a river ecocycle to the tragic end results of indiscriminate discharge of the urban and industrial effluents, the program pre-sents a beautiful photographic essay of the causes, effects and solutions of water pollution.

The demands placed on the Earth's water supply by its major users are increasing at an alarming rate. This raises the specter of Man surrounded by a chemical vegetable soup. We find that the health hazards of water pollution are increasing, with the number of waterborne virus diseases now over one hundred. The program concludes by stating the need for informed citizens working through organizations for water conservation.

Upon viewing this film one may wonder if someday, like Coleridge's *Ancient Mariner*, we may find there is "Water, water everywhere, nor any drop to drink."

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SUGGESTIONS FOR CLASS ACTIVITIES

- Basic Library Resource: "Stream Preservation in Arkansas" can be obtained <u>free</u> and in limited quantities from the Arkansas Department of Planning, Capitol Hill Building, Little Rock, Arkansas 72201. Two other publications from the same agency are available at the <u>same low price</u> and are excellent resources for Eastern Arkansas schools: "Disappearing Wetlands in Eastern Arkansas" and "Progress in the Preservation of Delta Wetlands".

- Refer to the suggestions for a study of Air Pollution. Many of the suggestions can be easily adapted to this topic. Since the ecosystem is a <u>closed system</u>, the study of pollution cannot be entirely separated into air, water, solid waste, noise, pesticide and land use. Once you have decided on a strategy, committees of students can be made responsible for collecting and reporting information in each of the areas of pollution just mentioned.

- Like air, water was considered to be a "free good". Is (clean) water free? Who owns water resources of a locality, state, nation or the world? Who is responsible for the use made of water? Where does this responsibility begin and end? Should water users be required to return water to its source in the same condition in which it was obtained? Air "scrubs" itself clean by rain, but what does this do to the water resources? Remember: the ecosystem is a closed system.)

- Discuss the cost of having "clean" water (water that is useful in its natural state) at the expense of giving up other things. To keep our lakes and streams useful for recreation may lead to higher costs of consumer products.

- "Pure water is protected where it is scarce. To what extent is the water pollution problem simply a result of treating water as a free good? The economic answer is simply to raise the price of water. Make pollution expensive." Discuss.

- Fact: Arkansas has ample, relatively pure water. Arkansas is also a low income state interested in economic development. To some extent the "fact" is incomplete with the "interest". How shall we decide which has priority? See Governor Bumpers' quote on page II.

- Society may determine that it is more "economical" for Man to tolerate some degree of water pollution than to commit resources to insure pure water. How would you react to such a finding?

- Locate your water resources on base maps of your city, county and state (obtainable from the respective government seats).

- Home economics classes should read Barry Commoner's *Science and Survival*, pages 19-22, for a discussion of pollution by detergents. Present a list of popular household detergents to the class, ranked according to phosphate content. Stress the importance of using minimum quantities of detergents when washing clothes.

- Have students write a science fiction story about what life would be like in your town if water were in critical short supply.

- Play recordings or have students perform music about water and water pollution. Examples include Handel's *Water Music*, *My Dirty Stream* by Pete Seager, *Pollution* by Tom Lehrer, Strauss' *Blue Danube* and the *River Hymn* by J. R. Robertson of *The Band*.

- Art classes could center an activity about the theme of water and water pollution by using practically any media for expression.

- Math classes might estimate the amount of water used in normal household operations such as bathing, washing dishes, etc. Sum this up over a year for a family of four.

- Have science students conduct water collecting expeditions so as to have laboratory samples from various sources in the community, including ordinary tap water. First perform a series of tests requiring no equipment, recording such things as appearance and taste. Then, using chemical and biological materials, test for such things as dissolved oxygen, phosphates, coliform levels, etc. (Consult a reference such as *Standard Methods for the Examination of Water and Waste*, American Public Health Association, Inc.)

- Visit your local water and sewage treatment plants. Science classes should study the various steps in the treatment processes. Social studies classes should consider the costs of these processes and how your community pays for them.

- What would be the effect on your community if the Arkansas Pollution Control and Ecology Commission found that your city's water treatment system or sewage facilities did not meet the proper standards and would have to be shut down? For information write for the "Vote for the Sewer Rate Increase" pamphlet, c/o Bedell-Earnhart Advertising Agency, P. O. Box 131, Fort Smith, Arkansas 72901. It is an excellent eye opener.

ΘΘΘ

A crow drifts slowly down the Missouri River riding a raft of solidified grease and animal tissue held together by a binder of hog hair. Only a carrion bird could stand the smell, yet many downstream cities take their drinking water from this river.

--Louis S. Clapper
National Wildlife Magazine
October-November, 1963

Before I built a wall I'd ask to know what I was walling in or walling out and to whom I was like to give offense.

--Robert Frost

This land is your land,
this land is my land,
from California
to the New York Island...

--Woody Guthrie

SCENIC POLLUTION

A part of the series, *Man and Environment*, produced for television by Miami-Dade Junior College, Miami, Florida

Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

The program opens with an old-fasioned western gunfight with a surprising conclusion, and then it traces Man's relationship with nature. The European practice of conquering nature is contrasted to the American Indian's life of nature co-existence. Immigration of the white man from Europe brought a "subdue the Earth" attitude to North America. His view of natural resources as infinite caused him to deplete areas and then simply move westward. Now that North America is settled, we must preserve the remaining places of natural beauty.

Several sources of today's scenic pollution are shown, among them advertising, sewage, oil spills and solid wastes. The program concludes by dealing with solutions. Industrial practices of "planned obsolescence" and excessive packaging of products need to be eliminated and more biodegradable materials need to be used in manufacturing. Recycling of materials should be planned as part of normal production and operation costs.

Persons viewing this module should recognize that we all contribute to the problems of solid waste and scenic pollution. Latest studies reveal that every American generates six pounds of solid waste daily. The possible solutions dealt with in this program must be implemented immediately.

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SUGGESTIONS FOR CLASS ACTIVITIES

- Conduct a campaign to clean up your school or community. Then have a "plant in" or other beautification project.
- Explain the meaning of the term "non-biodegradable". Discuss problems such materials present to our solid waste disposal operations. (Consider packaging materials, aluminum products such as trays and cans, garbage bags, etc.)
- Design and produce an imaginative poster campaign directed at preventing litter and discouraging indiscriminate dumping into streams, on public property, etc.
- Art classes could hold a "scrap craft" exhibition featuring student works created from materials discarded as trash.

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- Social studies classes might investigate the factors that caused this country to depart from the puritan practice whereby taste was emphasized, beauty and craftsmanship valued, and towns designed which were harmonious in form.

- Examine the solid waste disposal system in your own community. Add this information to the base map of your community started earlier. How is solid waste disposal related to air pollution, water pollution and land use planning? How much does solid waste cost your community in terms of taxes, health, pestilence, etc.?

- Examine the factors that contribute to solid waste such as overpackaging, no deposit-no return, planned obsolescence. Do these represent wise use of limited resources? Could these resources be used to alleviate some of the cost of improved solid waste disposal?

- Conduct a poll of the group to determine what <u>proportion</u> of total income each person would consider allocating to solving scenic pollution. (To get variations, a secret ballot would be preferable).

    a. What was the average percent (proportion) the group would allocate? What does this represent in alternative costs -- a shirt, suit, automobile, TV?

    b. What if the group average proportion will not solve the problem (undercommitment by the people)?

    c. Suppose that people prefer "planned obsolescence" - that we do not want things that last too long. What economic effect does this have on solving scenic pollution?

- Obtain a copy of Arkansas Act 640 which places restrictions on billboards and salvage yards. (Billboards must be 660 feed from highway; junkyards 1000 feet with visual screens around them) Is the law being enforced in your area? If not, find out why.

- How much scenic pollution is caused by vandalism in your community? Consult school and community officials and find out how much damage was done by vandals in the past year. Also discuss ways that thoughtless scenic pollution can be minimized. As a state with many tourist attractions Arkansas is highly vulnerable to littering, souvenir hunting, etc. How can your classes help prevent this?

- Art classes can study painters who devoted their talents to scenic beauty, such as the Hudson River School of Painters mentioned in the module. What would these artists paint today?

- To find out how their neighborhoods and city rank on scenic pollution, have your students take the following test:

    Instructions: In the blank to the right of each item write in the number requested and add it to the total. For question 5, subtract instead.

    1. Look out the nearest window. How many pieces of litter can you count? _____

    2. How many windows in your home have no view of trees? _____

3. How many trash cans surround your home or apartment building? _____

4. Drive down a major roadway near your home for about half a mile. Count the number of billboards and advertising signs. _____

5. Count the number of trees on the block where you live. Subtract this number. _____

Total Score _____

If your pollution test registered any total above zero, you live in an area of scenic pollution. Judge your area's scenic beauty according to the following "ugliness" scale:

50 and over	ugly
30 - 49	scenically unattractive
10 - 29	not bad - a few ugly areas
0 - 9	a real "Garden of Eden"

- Math classes can attempt to calculate when your city will exhaust its present landfill space. Use the information that the average person generates 6 pounds of solid waste per day, the current population of your town, the area of your landfill, the volume of the refuse when it is compacted by the bulldozer, etc.

- Investigate the possibilities for starting a recycling center in your community. (Fort Smith is opening one. For information send self-addressed stamped envelope to Western Arkansas Planning and Development, Inc., 510 North Greenwood Avenue, Fort Smith, Arkansas 72901.) (One center that has been in operation for some time is located in Fayetteville. For information send a self-addressed stamped envelope to Mrs. John Teas, 1532 E. Shadowridge Drive, Fayetteville, Arkansas 72701.)

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There were fifty mounted cannon in the battery, thundering, thundering, louder than before. Clarinets of every size and trumpeters who'd improvise a full octave higher than the score.

--Meredith Wilson
"The Music Man"

Far off noises of the world retreat, the loud vociferations of the street become an undistinguishable roar.

--Henry Wadsworth Longfellow

SOUND POLLUTION

A part of the series, *Man and Environment*, produced for television by Miami-Dade Junior College, Miami, Florida

Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

The early part of the program features Walt Disney's Jimminy Cricket explaining how sound operates in the human ear. A description is given of how pitch and intensity affect hearing. Following this segment the decibel scale, which is used to measure sound intensity, is explained. Noise is cited as an insidious pollutant of the environment which can inflict permanent damage on the physical and psychological health of Man. Hearing loss can occur rapidly, but most often occurs in stages, with the ability to distinguish certain sounds of speech gradually diminishing.

Several noisy settings are visited -- an office, a home, and a night club, to demonstrate the ways in which Man may encounter high noise levels without being completely aware of the hazards involved.

The module concludes by pointing out the need for noise abatement in the United States. This could be accomplished through control devices, soundproofing equipment, and effective legislation restricting noise levels.

Upon viewing this film, students will hopefully realize that their environment is growing increasingly noisier, and action must be taken to curb this trend. Since we live with noise all the time it is difficult to realize that much of it is unnecessary and can be eliminated.

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SUGGESTIONS FOR CLASS ACTIVITIES

- Science and math classes can use the study of the decibel scale to illustrate the principles of logarithms.
- Biology and health classes can relate this module to their studies of the structure and function of the human ear.
- Physics and physical science classes can use this material in connection with their studies of waves, acoustics, electronics, etc.

- Speech and music classes will want to watch this program to see how patterns in hearing loss relate to the ability to hear high-pitched sounds, the explosive consonants, etc.

- Invite your physics teacher, music teacher, or other qualified person, to visit your class and explain sound waves, sonic booms, basic concepts of guitar amplifiers, etc.

- Play records by noted rock bands who frequently perform at high sound levels. Discuss the acoustical design of a famous rock night club such as the Fillmore East in California. Compare that structure to the place where a band might play for a dance at your school.

- Home economics classes might contact a local contractor for information on good construction practices for providing proper soundproofing of a home. They should also discuss household appliances and list ways to reduce noises around the home. (Place appliances on pads, turn down telephone ring, hang drapes, etc.)

- Find out from local officials what legal regulations control noise levels in your community. Encourage them to implement any new noise ordinances that may be necessary.

- What are the important alternative costs to noise abatement? For example, most machinery is "quieted" by oil and grease - the oil industry is also a major source of pollution. Can we afford the costs of stopping most noise?

- What level of noise is acceptable? How do we decide <u>which</u> noise must be reduced? More importantly, <u>who</u> decides?

- Given young peoples' interest in loud music, is it possible that there are positive economic values to some noise? If so, how do we weigh the positive economic values against negative values?

- Ask students to keep a "sound diary" for one day, listing the various noise environments they were exposed to and estimating noise levels. (i.e., automobile to school, 72 decibels, noise level in hall, 65 decibels, bell for first period, 85 decibels, etc.) Compare your findings. A good reference for this activity is "The Ear Pollution - Noise" reprinted from October, 1971, AFL-CIO *American Federationist*, obtainable free in limited quantities from: AFL-CIO Education Department, 815 16th Street N. W., Washington, D. C. 20006.

- English classes might contrast writings of poets written in or about a quiet environment to those written in a noisy one. Music classes might do the same thing with musical compositions.

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George Bernard Shaw entered a posh London restaurant, took a seat, and was confronted by the waiter. "While you are eating, sir, the orchestra will play anything you like. What would you like them to play?"

Shaw's reply? "Dominoes."

"If a man walks in the woods for love he is esteemed a loafer, but if he spends his day shearing off those woods he is esteemed industrious and enterprising."

-Henry David Thoreau

"Conservation means the wise use of the earth and its resources."

-Gifford Pinchot

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CONSERVATION OF VITAL RESOURCES

This module seeks to determine the place of natural resources in man's environment and the importance of conservation of these resources. The module categorizes all these resources as either renewable or non-renewable; living or non-living; regenerative or reusable; and cyclic or non-cyclic. The program stresses the importance of man understanding that earth is a closed natural system in regard to matter. An intelligent understanding of man's role in this interdependent system is essential for effective management of resources. It is vital to understand the problems encountered economically, politically and sociologically in planning solutions for effective management. Various examples of man's management and mismanagement of resources are given, along with examples of his attempts to deal with future implications of this mismanagement. One ultimate solution may involve the restraining of individual liberties in order to preserve our resources and perhaps even mankind itself.

Have students:

- Sketch the water cycle, carbon cycle, oxygen cycle and nitrogen cycle.
- Write one example of a natural extinction of a species and one which may have been caused by man.
- List those common materials which are recyclable.
- Find out what agencies in Arkansas are involved in long-range planning for conservation of natural resources. Contact them for information regarding their work.
- Explain how the value of natural resources fluctuates with supply and demand. (i.e., compare the market value of various metals today to ten years ago.
- Find out what impact the Viet Nam War has had on our supply of natural resources. Does Southeast Asia possess any resources which our nation is interested in purchasing? (Oil, for example.)
- Arkansas is about 55% forest land. (18,278 acres out of a total area of 33,324.) Contact a forestry company in the state and find out what conservation practices are being applied to the state's forests. For example, write:

  Georgia-Pacific
  Crossett Division
  Crossett, Arkansas 71635

(Georgia-Pacific was named for Top Class I Gold Medal honors by the Sports

Foundation, Inc., a group dedicated to development and protection of recreational resources. GP won the award for their efforts in water pollution control, as they installed $4 million in mechanical aerators and other types of new water quality control equipment.)

- Contact the Arkansas Planning Commission, Capitol Hill Building, Little Rock, Arkansas 72201 for a copy of Stream Preservation in Arkansas, an excellent publication dealing with efforts to preserve unaltered natural streams and waterways in the state. Investigate the current status of the streams in your area. Are they being polluted, channelized, dammed, or otherwise altered?

- Through field trips, contrast conditions on farms where soil resources have been properly and improperly managed.

- Contact the aluminum companies south of Little Rock to discover how rapidly the state's supply of bauxite is being depleted. What are these companies doing to heal the scars to the land caused by strip mining?

- Make a report on the state and national parks in Arkansas, how they were established, the kinds of resources involved, the regulations governing private use of these resources, etc.

- If one of the students owns a hunting license, have him discuss game laws for the class, or question local authorities regarding these laws.

- Find out how many Christmas trees went unsold and were discarded last December in your town. Can you suggest an alternate method of supplying the public with these trees?

- Investigate and discuss Article IV, Section 3, Clause 2 of the U. S. Constitution which provides: "The Congress shall have power to dispose of and make all needful rules respecting the territory and other property belonging to the United States." What does this clause mean? What land does it include?

- Invite a jeweler to speak to your class of the supply and prices of diamonds, gold and other precious materials and how these markets have changed in the past few years.

- Obtain the films Wealth of the Wasteland and the Minerals Challenge for two excellent accounts of mineral depletion and the search for solutions to this critical problem. (See film index at the back of this document.)

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"We are asking all our customers to keep their usage of electricity at a conservative level during the hours of 9 a.m. to 5 p.m. on hot days. We do not ask you to stop your air-conditioners, unless specifically so advised."

-Notice to customers from an East Coast Electric Utility Company, 1970

"Power to the people."

--Unknown Radical

EARTH AS AN ENERGY SYSTEM

The program deals with man's impending energy crisis by first attempting to explain the meaning of energy and how energy flows and changes in form throughout the biosphere. The viewer sees this explained as two students visit a science laboratory and examine a series of charts, globes, etc. The earth is seen as an open energy system with all processes of the earth requiring energy expenditure. Most energy available to man comes directly or indirectly from the sun, with man changing its form to suit his needs. The program stresses man's increasing demand for energy which is creating a situation whereby there soon may not be enough resources to meet his needs. The program concludes by examining alternate sources of energy that are potentially available to man, underlining the urgent need to develop their utilization.

- Θ First have your students make an attempt at defining energy. Have them give examples of energy utilization.
- Θ Discuss the relationships of the earth to the sun, specifically the amount of energy received and distributed from the sun.
- Θ Have students attempt to answer the question where does energy come from? Keep in mind that at present man gets his energy from these sources: oil, 43 percent; natural gas, 32 percent; coal, 20 percent; hydroelectric power, 4 percent; and nuclear, 1 percent.
- Θ Measure the temperature change when an Alka-Seltzer dissolves in a glass of water. Challenge the students to explain what has happened.
- Θ Have students stage a debate on the controversial Alaskan pipeline which would bring oil from the north slope of Alaska, through Canada, down into the United States. This issue is currently before the U. S. Supreme Court with a decision expected in the spring of 1973.
- Θ Have students report to the class about the lives and works of famous scientists who studied energy. A list might include Carnot, Joula, Rumford, Clausius, and Einstein.
- Θ Let students investigate the ways in which man has used such energy resources as wind and water power throughout history to sail boats, draw water, grind flour, etc. Have them build models of some of these devices, such as windmills, water wheels, etc., in order to demonstrate the small percentage of the potential power of such resources that man has managed to harness and the endless experimentation involved.

θ Have students calculate how many gallons of gas their family car will consume during the lifetime of its use. Multiply this figure times the 100 million automobiles in America today.

θ Have students describe the major cultural steps in the development of human society in terms of the dominant energy sources utilized in each of the following:

a. Hunter-Gatherer
b. Agrarian
c. Industrial
d. Post Industrial

θ Assign as an outside reading assignment the excellent article "The Search For Tomorrow's Power" in the November, 1972 issue of National Geographic.

θ Make a diagram of how your local power plant makes electricity. If possible visit the plant and observe it in operation.

θ Make a similar diagram showing how a nuclear power plant makes electricity. Find out all you can about "Arkansas Nuclear One", the southwest's first Nuclear-Fueled Electric Generating Station located about five miles from Russellville on a peninsula jutting into the Dardanelle Reservoir. Write:

Joe Patterson
Manager, Environmental Affairs
Arkansas Power & Light Company
9th and Louisiana Streets
Little Rock, Arkansas 72203

θ In the summer of 1971 Arkansas Louisiana Gas Company went before the Arkansas Public Service Commission to ask relief from supplying large-volume industrial consumers at low rates. It got this relief when the Commission in effect voided 48 industrial contracts, most of them long range. These were renegotiated at higher prices. Find out how the depletion of natural gas is effecting the economics of gas usage. Find out all you can about the Anadarko pipeline which will deliver new gas from western Oklahoma to Arkansas. Write:

Arkla Gas Company
400 E. Capitol
Arkla Plaza
Little Rock, Arkansas 72204

θ It has been stated that use of water power for energy production is not expected to greatly increase in the United States. Have your class brainstrom this subject. Follow the discussion with research.

θ In 1972, a Governor's Energy Forum was created to survey the energy usage in Arkansas and to advise the Governor in policies related to this subject. For information concerning the energy crisis in Arkansas send a self-addressed, stamped envelope to Dr. Otto Zinke, Physics Department, University of Arkansas, Fayetteville 72701.

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- For information and educational material concerning petroleum write Arkansas Petroleum Council, 301 Commercial National Bank Building, Little Rock, Arkansas 72201.

- If the demands for coal increase, we may see more coal strip-mining in Arkansas. Have your class discuss their feelings in regards to strip-mining vs. Arkansas' scenic beauty.

- For English class, have your students write scenarios describing the energy crisis. What would be the effects on people in larger cities. How would life in the rural sections be affected. How would such an energy crisis affect both rural and urban dwellers economically.

- Art classes could sketch natural setting with coal or make wash paintings with used oil that is dirty in varying degrees.

- Economics and Social Studies classes could discuss the possibility of reaching a "negative balance of trade" in the U. S. import of oil.

We used to be individuals, not populations. Perhaps we are now preparing for the great slaughter. No reason to be alarmed; stone-dead is dead; breeding like rabbits we hasten to meet the day.

--Robinson Jeffers

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POPULATION DYNAMICS

A part of the series, *Man and Environment*, produced for television by Miami-Dade Junior College, Miami, Florida

Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

This program deals with the exploding growth of the world's population and those factors which control populations. These include food supply, disease, and stress. These factors have always limited the populations of living species on the Earth, but Man, through his progress in agriculture, technology and medicine, has upset this natural balance, the result being an upward spiral of population growth. The underdeveloped countries are the ones experiencing the most rapid growth. The measurement of population growth is explained with calculations for some representative countries, giving the annual birth and death rates per thousand persons, and the expected "doubling times" for those countries.

The program concludes by stressing the need for worldwide family planning as a necessary prerequisite to economic and social progress.

The subject of this module touches many bases. Students should realize that more people mean more problems for the environment. As Dr. Paul Ehrlich wrote in the *Population Bomb:*

> *Too many cars, too many factories, too much detergent, too much pesticide, multiplying contrails, inadequate sewage treatment plants, too little water, too much carbon dioxide.. all can be traced easily to too many people.*

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SUGGESTIONS FOR CLASS ACTIVITIES

- Research the history of the world's population growth. What effects have the natural checks of pestilence, famine and war had on world population trends? How has Man's technology effected these trends? Arkansas Department of Education film "Population Ecology".

- Find out who Thomas Malthus was, and what forecasts he made for the future of Man in 1798 regarding an explosion in world population. Compare his forecasts to present-day writers such as Dr. Paul Ehrlich, author of the *Population Bomb*.

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- Students of economics should investigate how the law of diminishing returs applies to human population growth. You should also investigate the economic effects of a zero population growth rate for our country and the world. Consult the following differing sources. *Baby Bust Replaces Baby Boom* by George Grier. Washington Center for Metropolitan Studies, September 7, 1971, and The Report of the U. S. Commission on Population and the American Future, available from your congressman or Zero Population Growth, Inc., 4080 Fabian Way, Palo Alto, California 94303.

- Math classes can relate population doubling times to percent annual increases through a study of series progressions or logarithms. Have students calculate and graph a populatio. of ten, increasing geometrically by a factor of 2X each generation for ten generations, on both linear and semi-logarithmic graph paper. Then have them draw a line graph showing the human population of the Earth from 8000 B. C. to the present and extrapolate to the next one hundred years on both linear and semi-log scales. Compare these to the graphs in the first problem.

- Center a class unit of study about the world hunger problem. Find out what is meant by the "Green Revolution". What are the prospects for radical new developments in food technology such as commercial hydroponics? Excellent resource - *1972 Annual Supplement to World Book Encyclopedia.*

- Home economics classes can relate the above suggestions to a discussion of nutrition and minimum daily needs of calories, vitamins and proteins.

- Science and health classes can relate the principles and problems of birth control to studies of the human reproductive system.

- Science and social studies could discuss the differing opinions of Dr. Paul Ehrlich and Dr. Barry Commoner concerning the relationship of technology and population to pollution. Consult *Environment Magazine*, April, 1972, and *Clearcreek Magazine*, July-August, 1972.

-** Invite a local physician or county health clinic official to discuss birth control and family planning with your students. Find out if there is a family planning clinic in your community. (There are 75 in Arkansas in 60 counties.)

- Compare the latest Arkansas legislation (Act 61, February 17, 1969) to the statute it replaced (Act 443, March 15, 1961). It is obvious that the law has been somewhat "liberalized". How do your students feel about this very controversial issue?

** Ask students to find out the official position of their church concerning abortion and birth control in general. (For example, what exactly does the Pope's recent encyclical, *Humanae Vitae*, say about these issues?)

- Have students read Jonathan Swift's classical satire about overpopulation, poverty, and cannibalism: *A Modest Proposal.*

- Have your students conduct a poll to explore public attitude on desired family size. Examine attitudes through history. English classes should read the conversation between Capulet and Paris in Shakespeare's *Romeo and Juliet* concerning

** teenage marriages and the scene in Henry Fielding's *Tom Jones* where Squire Western and the parson discuss the attitude that Tom is merely demonstrating his masculinity by fathering illegitimate children.

**These, and some other suggested activities, may be unacceptable in some communities. If in doubt, teachers should discuss them with local school authorities.

- English classes are afforded in the population crisis an excellent topic for science fiction or scenario writing.

- Art classes should find the population crisis a subject worthy of their creative endeavors using several types of media, the collage being one likely possibility.

- Home economics, family living or social studies classes might investigate the national problem of child abuse - by members of the children's own families. Large city hospitals see hundreds of these cases every year. Are these unwanted children who were conceived accidentally?

- Find out what is meant by the term "zero population growth". Investigate the ideas and goals of the environmental organization, Zero Population Growth, Inc. There are now ZPG chapters in Fayetteville, Russellville and Little Rock which could assist you. The address of the national office is: Zero Population Growth, 4080 Fabian Way, Palo Alto, California 94303. For information concerning the local chapters in the state write the Central Arkansas Chapter of ZPG, c/o Mrs. Marlene Mackie, 3 Spotwood, Little Rock, Arkansas 72207.

- An excellent brainstorming classroom activity has been produced by the Denver Chapter of ZPG entitled "Population 2000". When used in the classroom it produces discussion in all areas of the environmental crisis. "Population 2000" is available free from the Central Arkansas Chapter (see above address).

- An excellent resource on population information is the Population Reference Bureau. Inc. A list of publications is available from the Bureau, 1755 Massachusetts Avenue, N. W., Washington, D. C. 20036. Regular membership, $8.00; teacher or student membership, $5.00; library subscription, $5.00. One bulletin that may be of special interest is entitled, "Toward A. U. S. Population Policy", Vol. 27, No. 3.

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TESTAMENTS

OLD

Be fruitful, and multiply, and
Replenish the earth,
And subdue it: and
Have dominion...

NEW

Blessed are the meek
For they shall inherit
The earth...

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Bragging and laughing that under his wrist is the pulse, and under his ribs the heart of the people, Laughing! Laughing the stormy, husky, brawling laughter of Youth, half-naked, sweating, proud to be Hog Butcher, Tool Maker, Stacker of Wheat, Player with Railroads and Freight Handler to the Nation.

--Carl Sandberg
"Chicago"

I am a rock, I am an island. And a rock feels no pain, And an island never cries.

--Paul Simon

URBANIZATION

A part of the series, *Man and Environment*, produced for television by Miami-Dade Junior College, Miami, Florida

Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

The topic of Urbanization is the CITY ... an institution that affects all viewers, whether they live downtown, in suburbs, or in rural and semi-rural outlying areas. The program opens with an amusing animation based on James Thurber's story of the *Lemming and the Professor*. Accounts are given of the lemming phenomenon and other examples of how animals under the stress of overcrowding suffer population "crashes". We see that the tendency of Modern Man to crowd into urban areas is producing serious problems of health and behavior. We find that today 70% of the world's population lives in an urban environment. One projection sees this trend leading to a universal city, an "ecumenopolis", covering the face of the globe by the Year 2100. To seek an explanation for this development the birth and growth of early cities are traced.

Today's modern cities, having rapidly evolved out of the agricultural and industrial revolutions, suffer from all the problems of hurriedly built, poorly planned institutions. Urban Man faces a spiraling crime rate, traffic congestion, poverty, pollution and a general condition of stress which degrades both his mental and physical health. He encounters difficulty finding identity in an environment growing increasingly impersonal.

The last segment of the module deals with action needed to alleviate these conditions. Solutions could lie in a different approach to zoning, national policies of land use planning, and the one unique innovation already in existence today -- the creation of "new towns".

The viewer, having considered the problems of the city, may reflect on its virtues. The city serves Man as his locus of culture, of politics, of diversity. Many of us sense a magnetic excitement there, and are often drawn to the bustle and din. How can Man make his city livable, without destroying its virtues?

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SUGGESTIONS FOR CLASS ACTIVITIES

- Have students research accounts of behavioral studies of animals in a crowded,

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stressed environment. Studies might include John Calhoun's rat studies, John Christian's studies of sika deer, accounts of lemmings who stampede down the Scandanavian Alps into the sea, etc. (Consult two books: *The Social Contracts* and *The Territorial Imperative* by Robert Ardrey, and *The Hidden Dimension* by Robert T. Hall). Do these studies have implications for Urban Man?

- According to the 1970 census, Arkansas' urban population count was 960,865. (The U. S. Census Bureau defines urban population as a population of over 2,500 in a given closely settled territory). This urban count represented 50.0 percent of the state's total population count of 1,923,295 and signified the achievement of a high point for the urban share. To what factors can the state's urban growth be attributed? Have students investigate this topic. List the economic advantages and cost of urban living.

- What effects can you and your students recall that this urban change has had on:

  A. Relative importance of types of employment
  B. Types of problems confronting the Governor and legislature
  C. Relative importance of air transportation, bus systems, size of shopping centers
  D. The political power of the "farm" element versus the urban dweller

- Students could conduct school and community surveys of new residents to discover the reasons why they moved to your town. They might also consider persons they know who have recently moved away from your town. Why did they move? Has your area gained or lost population? Why? What sections of Arkansas are gaining population? Why? What sections are losing population? Why?

- This module speaks of our ever-increasingly depersonalized society. English classes might explore the roots of this situation as seen by great writers. For example, Charles Dickens' *Hard Times* and *Bleak House* deal with this situation in England in the Nineteenth Century. Many American writers, such as Melville, Miller, Williams, and Fitzgerald produced works about this theme. The problems of the cities are captured by the detective novels of Dashiell Hammett and Rex Stout as their heroes, Sam Spade and Nero Wolfe, fought crime in the city. Assign portions from some of these works which express this mood of the imprisonment of the human spirit in an urban environment.

- English and social studies classes should read *The Greening of America* by Charles Reich which seeks to explain the feelings of many young Americans who seem alienated from society. Our society has bred a long line of distinguished exiles, from Henry James to James Baldwin. Suggest to students that they read some of their works and discuss them. Art classes can discover similar rebels among artists from Theodore Drieser and William DuBois to LeRoi Jones and the artists of the New Left.

- Science classes who study the functions of the adrenal glands should be aware of the evidence that these are found to be greatly enlarged in animals who died under stressed conditions.

- One hope given in this module for improving urban conditions is the development of "new towns". One such town is being planned near Little Rock, to be called Maumelle New Town. The town is being developed under the New Communities Act of 1968 and is the first such in the South. It is being totally planned in advance of construction. Have students learn more about this town and how it will be unique from previous towns. (For example, there will be no traffic in residential areas, and homesites will be connected to schools and shopping facilities by open pathways).

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For information on Maumelle New Town contact Jess P. Odom, National Investors Life Building, Little Rock, Arkansas 72201.

- Check with your local officials to find out how the future growth of your town is being planned. If you have a City Planner or other similar official invite him to speak to your class. Find out all you can about zoning policies in your area.

- Assign Carl Sandberg's *Chicago* for English reading. Would a poet today write about Chicago in the same way?

- One possible solution to the problem of accommodating urban growth without excessive sprawl is the rehabilitation of aging buildings and neighborhoods. This is an important aspect of federally assisted "urban renewal" programs. Such agencies exist in about twenty Arkansas cities at present. For example, North Little Rock has seven projects in various stages of completion, involving over twenty-five million dollars. Have students find out more about this program. If there is such an agency in your town, go interview them, or invite a representative to speak to your classes.

- Discuss the alternate costs of making cities good places to live in versus dispersing the population more evenly over the land.

- Play Simon and Garfunkel's recording of "I Am A Rock" in class. Pass out copies of the words and hold a class discussion of their meaning.

- When your English classes are reading the works of the romantic poets, bring out the horrors of Nineteenth Century urban life and the protests of this way of life by Wordsworth, Shelly, Keats and others. T. S. Eliot's *The Hollow Men* and *Preludes* establish a strong atmosphere of middle Twentieth Century life.

- Home economics classes could research the housing problem of today and in the future; attempts at solutions, psychological problems of high rise apartment living, etc.

- Read *Is Population Growth Good for Your City* by Eric Johnson which discusses city size and its relationship to crime rate, tax increases, city services decline, etc. It is available from ZPG (see Suggested Activities on Population Dynamics).

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No person who is not a great sculptor or painter can be an architect. If he is not a sculptor or painter, he can only be a builder.

--John Ruskin
(1819-1900)

We shall not cease from exploration
And the end of all our exploring will be
To arrive where we started
And know the place for the first time.

--T. S. Eliot
"Four Quartets"

Food, glorious food,
hot sausage and mustard,
while we're in the mood,
cold jelly and custard.
Pease pudding and saveloys
What's next in the question?
Rich gentlemen have it, boys,
in the digestion...

--Lionel Bart
"Oliver"

FOOD AND DRUG POLLUTION

A part of the series, *Man and Environment*,
produced for television by Miami-Dade Junior
College, Miami, Florida
Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

This program presents some surprising information about food additives, pesticide residues, drugs and other substances that Man ingests, often without realizing it. The program opens with a review of a typical meal, pointing out the chemical agents present therein. Some of these are seen as potentially harmful to the consumer. An explanation is given of the ways these substances got into these foods, by processes such as growing, manufacturing, and packaging.

The government is seen as the only logical guardian of the public health. The agency assigned this task is the U. S. Food and Drug Administration, the F.D.A. Examples are cited of situations related to food contamination whereby this agency has been slow to report potential health hazards. As a result of these incidents, consumer spokesmen such as Ralph Nader have called for governmental reorganization, strengthened regulations and enforcement, and the establishment of independent agencies to help in this work.

Thus, throughout all the processes whereby foods are prepared for the public, there exists the possibility of contamination, either by accident or neglect or through materials purposely added to the product. These latter substances have uncertain long-term effects on the human body. Scientists testifying before Congress stated that in tests with animals 100 chemicals commonly added to foods showed adverse results ranging from mutations to cancer. The program concludes by stressing that this issue involves all of us, as we are all members of a captive audience, who must eat foods from a number of common general sources. The individual must look to the government for protection from this form of pollution.

Students should be made aware that many food additives are necessary for mass food production and all evidence indicates that these are safe for human consumption. The major point the program seeks to make is that the citizen must demand vigilance and safeguard over this vast industry that serves us all.

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SUGGESTIONS FOR CLASS ACTIVITIES

- Home economics classes could discuss convenience foods of today such as frozen vegetables, TV dinners, etc. and compare their nutritional and economical value to less preprared foods. Investigate how much food processing contributes to Arkansas pollution problems.

- Students studying chemistry could make a list of ingredients from some common food products and discuss the purposes and chemical functions of the additives.

- Students studying geography or economics could study and compare the three major farming techniques of the world: "slash and burn" in the tropics, Oriental rice farming, and western grain farming. Discuss the economics of farming, crop restriction, parity prices, subsidies, etc.

- Obtain and show the film *Norman Borlaug: Revolutionary*. (See free films list in this guide). This film concerns the work of a U. S. agronomist who won the 1970 Nobel Peace Prize for his work in developing high-yield wheat strains in an effort to ease world hunger.

- Have students report to the class on the characteristics and uses of pesticides, herbicides, and other chemicals which now prevail in nature. Point out that the Environmental Protection Agency has ordered an almost total ban on the domestic use of DDT effective December 31, 1972. Investigate how much our manmade chemicals contribute to our state's pollution problem.

- Assign Ralph Nader's study group report on the Food and Drug Administration: Turner, James, *The Chemical Feast*, New York, Grossman Publishers, 1970, 95¢ paperback.

- Obtain foods grown by organic gardening processes and have a class picnic. Ask students to report any differences in tastes between these foods and those they normally eat.

- Discuss the six general categories of drugs: proprietory drugs, stimulants, inhalants, hemp plant products, hallucinogens and opiates. Since the primary emphasis in this module is on antibiotics, spend most of your time on this category, pointing out that antibiotics are given to cattle to accelerate their growth and weight. An estimated 25 million Americans are allergic to some antibiotics.

- Discuss the role of heavy metals (lead and mercury) in pesticides and their effects on human beings when they appear in high enough levels in foods, (i.e., mercury in tuna).

- Invite a local grocer to speak to your classes concerning his business operations. Invite a pharmacist to discuss drug pollution.

- Discuss: "The world seems to be 'hooked' on pesticides and herbicides in much the same manner as the drug addict. Continued use means more chemicals in our environment and tissue. 'Cold turkey' would mean starvation for many and higher food costs for all." Examine carefully the social and economic costs of both horns of the dilemma.

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"Values are abstractions drawn from the flux of the individual's immediate experience."

--Robin M. Williams, Jr.

"Every time a value is born, existence takes on a new meaning; every time one dies, some part of that meaning passes away."

--Joseph Wood Krutch

VALUE SYSTEMS

The module opens it's examination of our value system by visiting one of the symbols of American affluence, a shopping center. Several customers are interviewed in an attempt to sample attitudes and values of typical Americans. The answers to the questions reveal some interesting contradictions, for these people, pushing carts filled with material goods express as their deepest hopes for the future such lofty goals as world peace and a clean environment. Thus the program demonstrates that conflicts arise from the application of the values of a traditional agrarian ethic to an urbanized, technological society. The program proposes that the roots of the current environmental crisis (pollution, resource depletion, population-urbanization) are found in the application of values in today's society. The module concludes by calling for a re-examination of our values and value processes to insure that any modification in values will reflect the interrelatedness of nature and man.

- Frederick Elder, a Presbyterian minister offers an interesting discussion of environmental theology and values in "Crisis in Eden", a religious study of man and environment, Abington Press, Nashville and New York, 1970. Use it as an outside reading assignment.

- Discuss the modern implications of the Biblical injunctions: "...Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing..." Genesis I, 28.

- Discuss how you would use material goods to try and make you secure and comfortable in the midst of an inner-city environment (i.e., design a plush apartment to your specifications). Attempt to define the good life; first in terms of physical possessions, and contrastingly in terms of more intangible things, such as sense of accomplishment, aesthetic appreciation, etc.

- Sociologist Roger Williams has set forth fifteen value orientations which he believed had particular relevence in the context of American history. These include achievement and success; activity and work; moral orientation; humanitarian wars; efficiency and practicality; progress; material comfort; equality, freedom; external conformity; science and secular nationality; rationalism and patriotism; democracy; individual personality. Have students select various of these and prepare a talk on how these orientations have affected the environment.

- Have students examine some recent events discussed by television commentators and newspapers, or interpreted by our art forms and attempt to relate these events to our values.

- In 1835 French sociologist Alexis de Tocqueville wrote of Americans "they will habitually prefer the useful to the beautiful, and they will require that the beautiful be useful." Does history agree with this assessment?

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- The youth movement of the late sixties and now the early seventies has involved a call for value changes, along with a rejection of machine technology. A protestor's sign observed at the People's Park in Berkeley read "The Politics of Ecology will Replace Both Capitalism and Marxism." Study the results of this movement, notably its music, literature and discuss this reassertion of humanism, authenticity, individualism, and even eccentricity.

- Eighteenth Century thought was greatly influenced by the precise work of several great scientists, notably Copernicus, Kepler, Galileo and Newton. The effects of their scientific achievements were felt in many other fields such as philosophy and literature, until the so-called Age of Reason evolved. The first really powerful reaction against this era was the Romantic movement, represented by such writers as Goethe, Coleridge, Wordsworth and Blake. Contrast the value systems of these two periods and compare them to modern day thought.

- Trace the relationship between Americans and their land from Indian times to the present. Discuss opposing views on land conservation philosphy based on differing values.

- Stewart Udall in The Quiet Crisis recommends that "the Buffalo of Arkansas... should be kept as a clean, wild river...a part of a rich outdoor heritage." Not all Arkansans agreed with this analysis. Discuss how values affected the controversy over the Buffalo becoming a part of the National Park System.

- Discuss the "Jesus Movement" and other religious activities of young people (i.e. "Hare Kirrsha") and their efforts to find spiritual values. Use materials such as Jesus Christ Superstar, and articles about occult practices, extra-sensory perception, and astrology.

- The English philosopher John Locke (1632-1704) advanced the theory that the mind of the new-born child contains no "inate ideas"; it is like a blank piece of paper on which anything may be written. If this is true, it is futile to search within oneself for a God-given sense of what is true or morally right. Instead one must look to nature and society to discover whether there are any "natural laws" that may exist. Conversely, if one wants to improve the quality of man's mind (and thus his values), one must improve the society in which he lives. Debate this view of the workings of the human mind.

- Construct a document for sampling public opinion regarding attitudes and values. Include items related to environmental issues. Administer this poll to a suitable group of people, such as your fellow students, or people in your community. Compile the results and discuss them in class.

"Change is the only permanent thing."

--Will Durant

CONCEPTS OF CHANGE

A Part of the Series, MAN AND ENVIRONMENT, produced for television by Miami-Dade Junior College, Miami Florida

Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

The module defines this indefinite concept and discusses it from a number of different approaches such as the rate of change in certain different periods of time and its rapid acceleration in the modern world.

The module stresses, as does Alvin Toffler's book "Future Shock", that education is the key to man's ability to cope with the rapid change in the near future. It also deals with how man adapts to change and how man's concepts of change are related to the problems of his environment. The present day acceleration of social change and its profound impact on man and his environment is well developed.

It is hoped that upon viewing this film students will realize that the continued rapid acceleration of technology renders imperative an enlarged concept of the term environment and a more inclusive study of how to use technology to combat the problem.

SUGGESTIONS FOR CLASS ACTIVITIES

- Assign the reading of articles in the following magazines to certain students and let them share their findings.

- The Futurist, a magazine published by the World Future Society, P. O. Box 30369, Bethesda Branch, Washington, D. C. 20014, 1 year $10; Future Shock by Alvin Toffler, Random House, 1970; The Limits to Growth by Meadows, Randers, and Behrens III. A Potomac Associates book published by Universe Books, 1972.

- History or Economics classes could discuss the viewpoints presented in "The Limits to Growth" with views of growth presented in the teaching guide "Economics in United States History, 1865-1970", Ila M. Nixon, Editor, available from the Arkansas State Council on Economic Education, Arkansas Department of Education, Little Rock, Arkansas 72201.

- Compare the effects on society of the changes brought about by the Industrial Revolution and the changes that have come about during the present era of accelerated technology.

- Science or Social Studies research and analyze the results of the knowledge explosion of recent years. How has this affected the students? Do they feel bombarded? How much information can man confront?

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- Θ The Futurist Magazine (listed above) has recently had several articles on the future of marriage as an institution. Relate the institutions to students feelings about family life responsibilities.

- Θ Investigate your students' feelings concerning drugs. Is the usage of drugs accepted? Do your students see an increase in drug usage or a decline in the future? If so, why? Does drug education help to decrease drug usage? Discuss the "consumer directed" characteristic of the Market Economy, Teacher's Guide, Page 2, Paragraph 6, Page 3. Does this indicate to you that drug production could be stopped by consumers?

- Θ Compare a list of today's youth wants and a list of wants their parents might have had at the same age.

- Θ Ask your students to list things they they would like to see change in education. Narrow these suggestions into five or six general statements (if possible and write these on the board and hold group discussions.

- Θ Impress the fact that changes in production of material goods and services that have changed America's life style have come as a result of research and development. Make a dateline of changes in sources of energy that had impact on production.

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To be or not to be
that is the question:
Whether 'tis nobler
in the mind to suffer
the slings and arrows
of outrageous fortune,
or to take arms against a
sea of troubles, And by
opposing end them?

--William Shakespeare
"Hamlet"

Behold the turtle,
He makes progress only
when he sticks his neck
out.

--James Bryant Conant

INDIVIDUAL INVOLVEMENT

A part of the series, *Man and Environment*,
produced for television by Miami-Dade Junior
College, Miami, Florida
Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

The program opens with a clever sequence depicting a secret agent pitted against his enemies. Upon gaining the upper hand over his arch-rival, our hero discovers the enemy is an exact replica of himself, which leaves us to draw an interesting analogy regarding who is creating our environmental dilemma. Then the program assumes a documentary posture, discussing how the individual is an integral part of the environment. Today, however, he often participates only vicariously and watches as the environment deteriorates around him. This attitude needs to be replaced with one of involvement, enlightenment, and moderation. Well-known persons, such as Rachel Carson, are described as individuals whose work in environmental protection has had a major impact. However, other lesser-known individuals are also making important contributions. Mrs. John Cox, a housewife, and Harry Hewitt, a high school English teacher, are two examples shown of people who are able to motivate others by their actions. The result of leadership such as theirs is that eventually many are involved in direct participation.

An important concept to be gained from this module is that our society is the victim of conflicting needs. We feel that we need the conveniences offered by technology and yet we want to escape technology's power and pollution. The greatest source of resistance to be encountered in individual involvement is from people who have been doing something for so long they are convinced it is right.

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SUGGESTIONS FOR CLASS ACTIVITIES

- Have every student in your class write down five things they can do immediately to improve their environment. Compile a class list and have them do these things and report back to the class. As these reports are made, check them off the list.

- Write F. H. "Ranger Jim" Martin, Specialist, Environment-Conservation, Department of Education, State Education Building, Little Rock, Arkansas 72201, for a copy of *Sixty-five Ways to Improve Your Environment*. Reproduce these for your students and compare them to the list prepared as suggested above.

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- Find out how individual Arkansans have instituted efforts to preserve the state's environment. For example, the members of the Ozark Society (Box 38, Fayetteville, Arkansas 72701) led the fight to preserve the Buffalo River, resulting in the U. S. Congress passing a bill establishing the Buffalo as a national river, under the management of the National Park Service. The Arkansas Ecology Center in Little Rock (316 Chester Street, zip 72201, phone 374-6271), was formed by a small group of individuals and depends on public contributions for support. It has been involved in two major court battles to preserve Arkansas' scenic rivers and corresponding wildlife areas. The Cache River Flood Control Project calls for the ditching of 232 miles of the Cache and its major tributary, Bayou DeView, and the draining of over 12% (250,000 acres) of timberland in Eastern Arkansas. The other project involves the construction of the Gillham Dam on the Cossatot River (in the Ouachita Mountains of southwest Arkansas). Environmentalists (the Ecology Center, the Game and Fish Commission, Environmental Defense Fund, etc.) challenged both projects in the courts and lost both cases. However both cases have been appealed to the Eighth Circuit Court in St. Louis and the U. S. Congress will soon vote on appropriations for these projects, so environmentalists are expressing their views to Arkansas' congressional representatives. Find out the pros and cons on The Buffalo, Cache and Cossatot Rivers.

- Home economics classes can certainly relate to the example of "household ecology" given in the module. Additional Discussions of these practices will give students good ideas for making ecology begom at home. (i.e. don't use colored tissues, some contribute to water pollution).

- *Macbeth* provides a good parallel to environmental problems today. One man attempts to bring his environment under total control regardless of any other element. Compare the success and failures of *Macbeth* with the results of the plunderings of Modern Man.

- John F. Kennedy's book, *Profiles in Courage*, provides excellent examples of men who stood up for what they believed to be right, often at great personal or political expense.

- In a social studies class define the "price" or "cost" of individual involvement in anything. If Man is a rational economic being, these costs must be balanced by satisfactions to entice involvement. What sort of realistic satisfactions come from individual involvement in improving the environment.

- Since most environmental pollution will have to be corrected through economic pressures or through the law (the actions of government), time should be taken to investigate the operation of government and the voting on environmental legislation.

- Pollution abatement is largely an educational problem. Any educational problem takes a long time to solve - perhaps several generations. Do we have a long time to solve some environmental problems? Longer to solve others? Discuss how the economic concept of "the economic man" can be used to shorten the time.

- Make publications on ecological involvement and individual action available for student use. Among the best ones are:

The User's Guide to the Protection of the Environment, Paul Swatck. Ballentine Books, 36 W. 20th Street, New York, New York 10003. $1.25

Everyman's Guide to Ecological Living, Greg Caillet, Paulette Setzer and Milbon Love. The Macmillan Company, 866 Third Avenue, New York, New York 10011.

The Voter's Guide to Environmental Politics, Garrett DeBell (ed.) Friends of the Earth/Ballantine Books, 36 W. 20th Street, New York, New York 10003. $ .95

National Reporter, (newspaper). Zero Population Growth, Inc., 4080 Fabian Way, Palo Alto, California 94303.

Not Man Apart, (newspaper). Friends of the Earth, 620 C Street S. E., Washington, D. C. 20003.

How to Stop the Corporate Polluters and Make Money Doing It, William H. Brown. Bellerophon Books, 153 Stueart Street, San Francisco, California 94105. $1.50

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Thus conscience doth make cowards of us all ...?

--William Shakespeare
(1564-1616)

What does a hawk know of Babylon? He knows only that his own dominion is gone forever - the green wilderness is vanishing swiftly and he who was once a king and looked down upon the swamp with a proud, impavid, golden eye has been dispossessed and is doomed.

But perhaps he is looking afar and sees farther from the top of his lonely cypress tree than we who are making our own doom, ever a Babylon.

--Lily Peter

For as long as man has dwelt upon this earth spring has been the season of rebirth and the singing of the birds.

Now in some parts of America spring has been strangely silent, for many of the birds are dead.

--Rachel Carson

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RESPONSIBILITY TO FUTURE GENERATIONS

A part of the series, *Man and Environment*, produced for television by Miami-Dade Junior College, Miami, Florida

Module Running Time: 30 Minutes
Panel Discussion: 30 Minutes

The program uses a science fiction type approach to speculate on Man's hopes for future survival as a species in the future. The presentation, although it assumes a rather somber tone, is very entertaining. Our host is a mysterious narrator from a future age who reflects back on "those tragic days of the 1970's" when Man was the ruling species on Earth. We are presented a number of scenarios in the form of "flashbacks" as the narrator examines the reasons why Homo sapiens vanished from the Earth. We are shown some familiar environmental leaders of the 1970's such as Russell Train and William Ruckelshaus as they discuss the problems Man faced at that time. We are told that Man's failure to solve several environmental problems led to his ultimate demise. For example, he failed to control his exploding population, using inadequate techniques such as economic sactions. He did not develop long-range plans for the controlled use of technology, the result being the chemical poisoning of the biosphere. He failed to establish effective controls over the use of his land. He did not effectively develop new energy sources to keep pace with his depletion of existing resources. For these and other reasons he became extinct.

The surprising conclusion to the program reveals that our unseen chronicler is a giant roach, speaking to a group of roaches who, as the last living species on Earth, realize that they too must plan or perish!

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SUGGESTIONS FOR CLASS ACTIVITIES

Θ Since this module is of a science fiction nature, English and drama students can relate it to a study of the novels and movies of the best science fiction writers and producers today. Much of today's science fiction deals with a world of the future which is a result of Man's inability to control technology. Book reports, essays, and term papers can examine this hypothesizing in the works of Kurt Vonnegut, Jr., Ray Bradbury, Arthur C. Clarke, and Isaac Asimov and in movies

such as *2001: A Space Odyssey* and *Dr. Hellstrom's Chronicle*. Drama classes might try their hand at eco-script writing and producing by putting on a play centered around this theme.

- English classes can study other works about alternate societies in the future, such as *Brave New World* and *1984*. They illustrate wrong solutions to problems bypassed in society today. Some classic works concerning Man's survival include Pearl Buck's *The Good Earth* and *The Grapes of Wrath* by John Steinbeck. One book which deals with a variety of futuristic environmental scenarios is edited by Rob Sauer - *Voyages: Scenarios for A Ship Called Earth.* Ballentine Books, 36 West 20th Street, New York, New York 10003. $ .95, paperback.

- The module deals with Man's attempts in the 1970's to solve his environmental problems. Investigate the current laws concerning environmental protection. (i.e., Clean Air Act of 1963, Rivers and Harbors Act of 1899, Population Growth and American Future Act of 1970, etc.)

- Find out all you can about the U. N. Conference on the Human Environment held in Stockholm in June of 1972. Who attended? What was accomplished?

- Have your students compile a summary of the ways that individually and collectively, the forces of pollution pose a threat to Man's survival. Also consider the factors of overpopulation and depletion of natural resources.

- Since planning and preparation for the future have real economic cost, discuss ways in which we may convince people to commit enough resources to abate pollution. Recognizing that fear tactics seemingly have little impact on humans short of catastrophic examples, must we have a series of disasters before we get meaningful planning?

- Man's social economics seems to require a "belief" about the future. Discuss different beliefs about the future and how they affect our decision making.

- Responsibility for future generations is a very personal economic question to most humans - involving only their own or very close offspring. Either the human thought process must be changed or the environmental issues must be made into personal questions. Consider this for class discussion.

- Man's survival is also intimately related to his weaponry. Trace the history of nuclear weapons, discuss the present-day situation regarding the arms race, and consider the possible results of a nuclear war.

- Social studies classes should examine the compatibility of the free enterprise system with environmental health. Consider the concepts of private property and the profit motive. Can these be preserved while measures are instituted which curtail one's freedom to dispose of property as one sees fit? Are there alternative approaches to this problem? Can external costs be "internalized"? (For example, placing price tags on all factory output including wastes as well as factory input). Does legislation offer solutions to environmental problems? Compare the enforcement of environmental legislation to problems in other legislative areas such as the civil rights movement.

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Θ Art classes could hold a "doomsday paint-in", creating drawings and paintings dealing with Man's future survival. They should try to examine both alternatives, i.e. depicting scenes of a future wherein Man has solved his environmental problems as well as contrasting scenes where he has not.

Θ Find out more about William D. Ruckelshaus and the agency he administrates, the Environmental Protection Agency, its origin, structure, powers and duties. Briefly, the agency was created under the National Environmental Policy Act of 1970 and is first and foremost, a regulatory agency, with responsibilities for establishing and enforcing environmental standards. For more information write your regional office:

United States Environmental Protection Agency
Edward Lee, Public Affairs Director
Suite 100, 1600 Patterson Street
Dallas, Texas 75201

Θ Find out more about Arkansas environmental statutes and the agency that regulates them, the Arkansas Department of Pollution Control and Ecology. This agency has three major functions. It conducts investigations, promulgates regulations and standards, and enforces these regulations and standards. For further information and to report violations, contact:

Department of Pollution Control and Ecology
8001 National Drive
Little Rock, Arkansas 72202
371-1701 or 371-1136

Θ About half of all species that ever existed on Earth are now extinct. Have your students research the reasons why this is true. Have them report on species currently in danger and what steps must be taken to save them. Remember: one of the most basic laws of ecology is that as an ecosystem grows less complex, it becomes more fragile.

Θ Take a look into the future by reading the final report of the U. S. Population Commission or for a shorter form read the *Themes and Highlights: Report of the U. S. Population Commission.* Both can be obtained from ZPG (see suggested activities on Population Dynamics).

Θ For another look at the future, you or your class could join the World Future Society. For your membership you will receive a subscription to *The Futurist Magazine* which deals with forecasting the future. This is not a crystal ball or mystic magazine for they feature sophisticated articles such as a review of the MIT study entitled *The Limits to Growth.* You may subscribe to the magazine without joining the society. Write to the Membership Committee, World Future Society, P. O. Box 30369, Bethesda Branch, Washington, D. C. 20014. Subscription membership or non-membership $10.00

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FREE FILMS

Association-Sterling Films
8615 Directors Row
Dallas, Texas 75247

"Vitamins from Foods"
"It's Your Decision-Clean Water"
"Norman Borlaug: Revolutionary"
"Toward Cleaner Air"

Audio-Visual Distribution
Eastman Kodak Company
343 State Street
Rochester, New York 14650

"All the Difference"

Shell Film Library
450 North Meridian Street
Indianapolis, Indiana 46204

"Air is for Breathing"
"Pesticides in Focus"
"Food or Famine"
"Rival World"

Film Librarian
Public Information Office
U. S. Atomic Energy Commission
P. O. Box E
Oak Ridge, Tennessee 37830

"The Warm Coat"
"Desalting the Seas"
"No Turning Back"
"The Endless Chain"
"The Atom and the Environment"

U. S. Department of the Interior
Bureau of Mines
4800 Forbes Avenue
Pittsburgh, Pennsylvania 15215

"Wealth of the Wasteland"
"The Minerals Challenge"

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Film Library
Division of Public Health Education
State Department of Health
Little Rock, Arkansas 72201

"Tomorrow's Children"

State Department of Education
Audio-Visual Service
Arch Ford Education Building
Little Rock, Arkansas 72201

ECOLOGY--GENERAL
"Nature's Plan" s
* "What is Ecology?" x

ECOLOGY--ADAPTATION
"Adaptive Radiation--The Mollusks" s-c
"First Many-Celled Animals, The Sponges" s-c
"Laws of Heredity" x
"Mitosis"

ECOLOGY--DESERT
"The Desert" j-s
"Desert Dwellers: Plants and Animals" j
"What Makes a Desert?" j

ECOLOGY--ENVIRONMENT
* "Ark" j-s-c
"Don't Crowd Me" j-c
"The Everglades" j-s
"Garbage Explosion, The" j-s
* "Gifts" j-s-c-a
"House of Man, The--Our Changing Environment" j-s
"Overload in Cities" j-a
"Physical Environment, The" s
* "Population Ecology" s
"Problems of Conservation--Air" j-a
"Problems of Conservation--Water" j-s
"Water Pollution" j-s
* "1985" j-s-c-a

ECOLOGY--FOREST
"Coniferous Forest Biome, The" s
"Problems of Conservation--Forest and Range" j-a

ECOLOGY--MARINE
"Conquering the Sea" j-c
"Sea, The" j-c
"World of Little Things" j-s

ECOLOGY--POND AND MARSH
"Fresh Water Pond, The" i-s
"Marshes of the Mississippi" i-s
"Pond Insects" j-s
"Waterfowl--A Resource in Danger" j-s

*These films have been personally viewed by your State Environmental Education Department and are highly recommended by them. This is not to say that the other films are of any less quality.

HOW TO ORDER:

1. Make request through authorized audio-visual coordinator.
2. Use AVS official request forms.

ATER TREATMENT, WATER SHORTAGE, SIERRA CLUB, SMOG, TEMPERATURE INVERSION, WANKEL ENGINE, ALDRIN, PE
EPTACHLOR, MERCURY, PHOSPHORUS, CHLORTHION, PARATHION, TEEP, BHC, TDEO, TOXAPHENE, THALLIUM, ANTU,
EMETRON, PHOSDRIN, EPN, ENDRIN, CHLORDANE, ARSENIC, DINITRO COMPOUNDS, PENTACHOLOROPHENOL, SODIUM,
LUORACETATE, DIMETHOATE, SCHRADAN, "MOMMY, MY FOOD TASTES FUNNY", NATURAL GAS SHORTAGE, WAR, THETA,
PACE TRAVEL, LAW, DEVELOPMENT, SURVIVAL, EARTH DAY, OCEANOGRAPHY, RADIATION, THE POPULATION BOMB IS
VERYBODY'S BABY, QUANTITY VS. QUALITY, LAND FILL, FAULT LINE, DONORA, PENNSYLVANIA-MARCH 1949, INF
ONDON "KILLER FOG", LUNG CANCER, CHRONIS BRONCHITIS, PULMONARY EMPHYSEMA, BRONCHIAL ASTHMA, TRILLIO
OLLAR ECONOMY, 2-4-T, 2-4-D, PLANNED OBSOLESCENCE, SCS, "THE CORPS", BUFFALO RIVER, BAYOU DE VIEW,
EPARTMENT OF POLLUTION CONTROL AND ECOLOGY, ECOLOGY CENTER, PRIVATE RIGHT VERSUS PUBLIC GOOD, URBAN
SPRAWL, PLANNED CITIES, URBAN RENEWAL, ARKANSAS RIVER DEVELOPMENT, STRIP MINING, JONES MILL, COAL HI
PEN BURNING, WATER AND AIR ARE FREE GOODS, ENVIRONMENTAL TRADE OFFS, DUST, WHITE RIVER, THE BIOSPHE
S A CLOSED SYSTEM, ARKANSAS PLANNING AND DEVELOPMENT DISTRICTS, "LAND OF OPPORTUNITY", "THERE IS NO
UCH THING AS A FREE LUNCH", "GIVE A HOOT, DON'T POLLUTE", "LAST YEAR OUR COMPANY SPENT ... ON POLLU
ONTROL", "IT PAYS TO ADVERTISE", "I WENT TO THE LAKE TO GET AWAY FROM THE CROWD", "MY EYES SMART",
DON'T DO IT IN THE LAKE", "WHAT'S THAT SMELL?", POLITICS, ECONOMY, CROWDING, VOTING, CARE, GENE
OLLUTION, TAXES, POVERTY, RESOURCES, ECO-FICTION, SST, PCB, PARTS PER MILLIGRAM, FOOD ADDITIVES, MO
ODIUM GLUTAMATE, TWO-CHILD FAMILY, HEAVY METALS, ZERO POPULATION GROWTH, OIL SPILLS, PROTEIN, SHORT
EVEN BILLION PEOPLE, "A COUNTRY THAT RUNS ON OIL", BIRTH CONTROL, CONSUMPTION, ABATEMENT, GNP, CAMP
ITES, SEWAGE, BURNING TRASH, PRESIDENT'S COMMISSION ON POPULATION AND AMERICAN FUTURE, PESTICIDES,
AMINE, LAND USE PLANNING, ERROSION FEED LOTS, MEAT PRICES, DEATH CONTROL, TRANSPORTATION, POLLUTION
INES, INDIVIDUAL INVOLVEMENT, INDIVIDUAL COMMITMENT, AUTOMOBILES, CARBON MONOXIDE, LITTER, RECYCLIN
ITROGEN OXIDES, THE CLOSING CIRCLE, OVER PACKAGING, SULPHUR DIOXIDE, INTERNAL COMBUSTION ENGINE,
ALD EAGLE, INDUSTRIAL WASTE, LEGALIZED ABORTION, VISIBILITY, EXTINCT, NOISE, FAMILY PLANNING, GREE
OUSE EFFECT, EIGHTY DECIBELS, POLLUTION FI[illegible]ON, AWARENESS, ENVIRONMENTAL ETHIC, YOU, GARI
XPLOSION, IRRIGATION, SEA FARMING, OVE[illegible]D, FOREIGN AID, THE PILL, DDT, FAMINE, W
REATMENT, WATER SHORTAGE, SIERRA CLU[illegible]ERSION, WANKEL ENGINE, ALDRIN, HEPTACH
ERCURY, PHOSPHORUS, CHLORTHION, PA[illegible]XAPHENE, THALLIUM, ANTU, DEMETRON, PH
EPN, ENDRIN, CHLORDANE, ARSENIC, D[illegible]PHENOL, SODIUM, FLUORACETATE, DIMETH
SCHRADAN, "MOMMY, MY FOOD TASTES [illegible]R, THETA, SPACE TRAVEL, LAW, DEVELO
URVIVAL, EARTH DAY, OCEANOGRAPHY[illegible]IS EVERYBODY'S BABY, QUANTITY VS.
UALITY, LAND FILL, FAULT LINE, [illegible]NDUSTRIAL WASTE, LONDON "KILLER FO
UNG CANCER, CHRONIC BRONCHITIS,[illegible]THMA, TRILLION DOLLAR ECONOMY, 2-4
-4-D, PLANNED OBSOLESCENCE, SCS,[illegible]U DE VIEW, DEPARTMENT OF POLLUTION
CONTROL AND ECOLOGY, ECOLOGY CENT[illegible]GOOD, URBAN SPRAWL, PLANNED CITIES,
RBAN RENEWAL, ARKANSAS RIVER DEV[illegible]ILL, COAL HILL, OPEN BURNING, WATER
ND AIR ARE FREE GOODS, ENVIRONMEN[illegible]VER, THE BIOSPHERE IS A CLOSED SYSTE
RKANSAS PLANNING AND DEVELOPMENT DI[illegible]ITY", "THERE IS NO SUCH THING AS A FRE
UNCH", "GIVE A HOOT, DON'T POLLUTE",[illegible]SPENT ... ON POLLUTION CONTROL", "IT PA
O ADVERTISE", "I WENT TO THE LAKE TO GE[illegible]ROWD", "MY EYES SMART", "DON'T DO IT IN THE
AKE", "WHAT'S THAT SMELL?", POLITICS, ECONOMY, CROWDING, VOTING, CARE, GENE POLLUTION, TAXES, POVE
RESOURCES, ECO-FICTION, SST, PCB, PARTS PER MILLIGRAM, FOOD ADDITIVES, MONOSODIUM GLUTEMATE, TWO-CH
FAMILY, HEAVY METALS, ZERO POPULATION GROWTH, OIL SPILLS, PROTEIN, SHORTAGE, SEVEN BILLION PEOPLE,
A COUNTRY THAT RUNS ON OIL", BIRTH CONTROL, CONSUMPTION, ABATEMENT, GNP, CAMP SITES, SEWAGE, BURNIN
TRASH, PRESIDENT'S COMMISSION ON POPULATION AND AMERICAN FUTURE, PESTICIDES, FAMINE, LAND USE PLANN
ERROSION FEED LOTS, MEAT PRICES, DEATH CONTROL, TRANSPORTATION, POLLUTION FINES, INDIVIDUAL INVOLVE
INDIVIDUAL COMMITMENT, AUTOMOBILES, CARBON MONOXIDE, LITTER, RECYCLING, NITROGEN OXIDES, THE CLOSI
CIRCLE, OVER PACKAGING, SULPHUR DIOXIDE, INTERNAL COMBUSTION ENGINE, BALD EAGLE, INDUSTRIAL WASTE,
LEGALIZED ABORTION, VISIBILITY, EXTINCT, NOISE, FAMILY PLANNING, GREEN HOUSE EFFECT, EIGHTY DECIBEL
POLLUTION FINES, EDUCATION, AWARENESS, ENVIRONMENTAL ETHIC, YOU, GARBAGE EXPLOSION, IRRIGATION, SEA
FARMING, OVER FED-UNDER NOURISHED, FOREIGN AID, THE PILL, DDT, WATER TREATMENT, WATER SHORTAGE, SIE
CLUB, SMOG, TEMPERATURE INVERSATION, WANKEL ENGINE, ALDRIN, PEST, HEPTACHLOR, MERCURY, PHOSPHORUS,
PARATHION, TEEP, BHC, TDEO, TOXAPHENE, THALLIU, ANTU, DEMETRON, PHOSDRIN, EPN, ENDRIN, CHLORDANE,
ARSENIC, DINITRO COMPOUNDS, PENTACHOLOROPHENOL, SODIUM, FLUORACETATE, DIMETHOATE, SCHRADAN, "MOMMY,
MY FOOD TASTES FUNNY", NATURAL GAS SHORTAGE, WAR, THETA, SPACE TRAVEL, LAW, DEVELOPMENT, SURVIVAL,
EARTH DAY, OCEANOGRAPHY, RADIATION, THE POPULATION BOMB IS EVERYBODY'S BABY, QUANTITY VS. QUALITY,
FILL, FAULT LINE, DONORA, PENNSYLVANIA-MARCH 1949, LONDON "KILLER FOG", LUNG CANCER, CHRONIC BRONCH
PULMONARY EMPHYSEMA, BRONCHIAL ASTHMA, TRILLION DOLLAR ECONOMY, 2-4-T, 2-4-D, PLANNED OBSOLESCENCE,
SCS, "THE CORPS". BUFFALO RIVER, BAYOU DE VIEW, DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY, ECOLOG
CENTER, PRIVATE RIGHT VERSUS PUBLIC GOOD, URBAN SPRAWL, PLANNED CITIES, URBAN RENEWAL, ARKANSAS RIV
DEVELOPMENT, STRIP MINING, JONES MILL, COAL HILL, OPEN BURNING, WATER AND AIR ARE FREE GOODS, ENVIR
TRADE OFFS, DUST. WHITE RIVER, THE BIOSPHERE IS A CLOSED SYSTEM, ARKANSAS PLANNING AND DEVELOPMENT
SODIUM GLUTAMATE, TWO-CHILD FAMILY, HEAVY METALS, ZERO POPULATION GROWTH, OIL SPILLS, PROTEIN, SHOR
SEVEN BILLION PEOPLE, "A COUNTRY THAT RUNS ON OIL", BIRTH CONTROL, CONSUMPTION, ABATEMENT, GNP, CA

EDUCATION

FOR

SPACE SHIP

EARTH

BEST COPY AVAILABLE